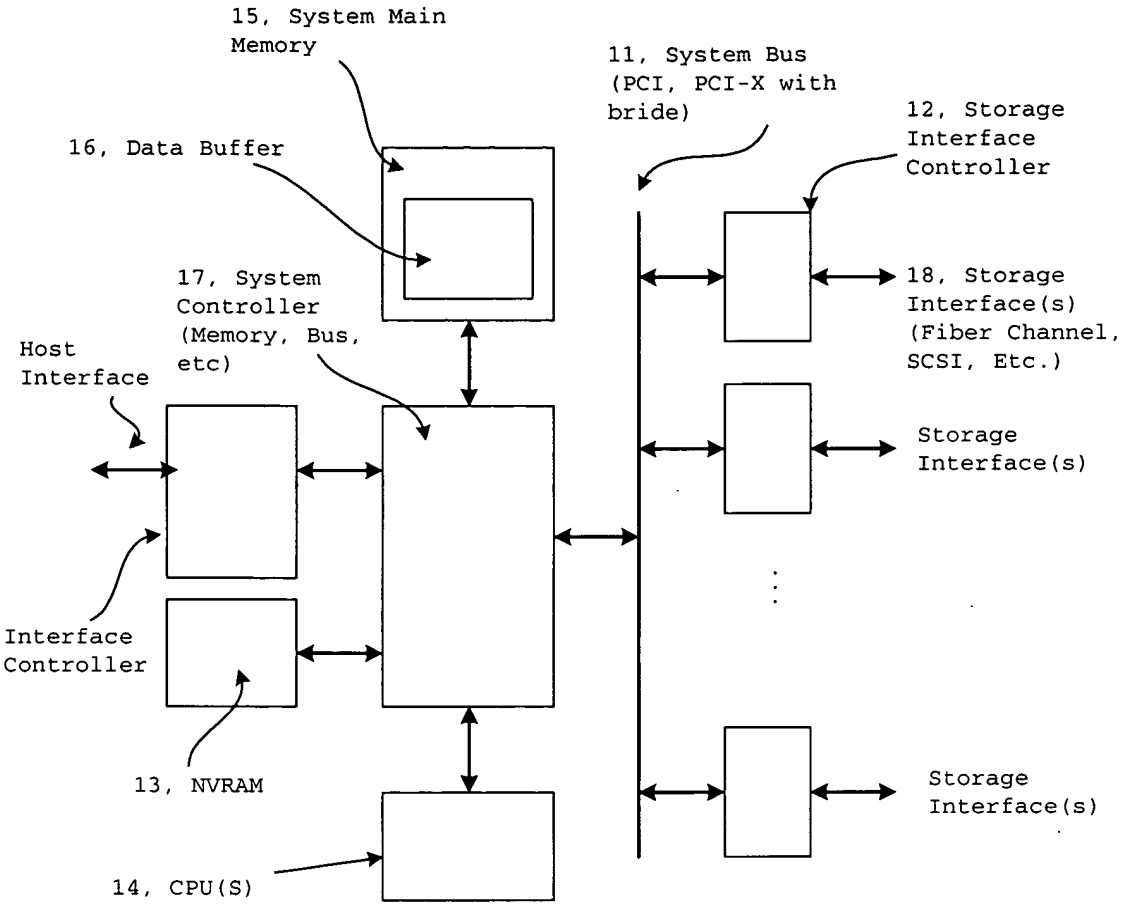


FIG. 1
Prior Art

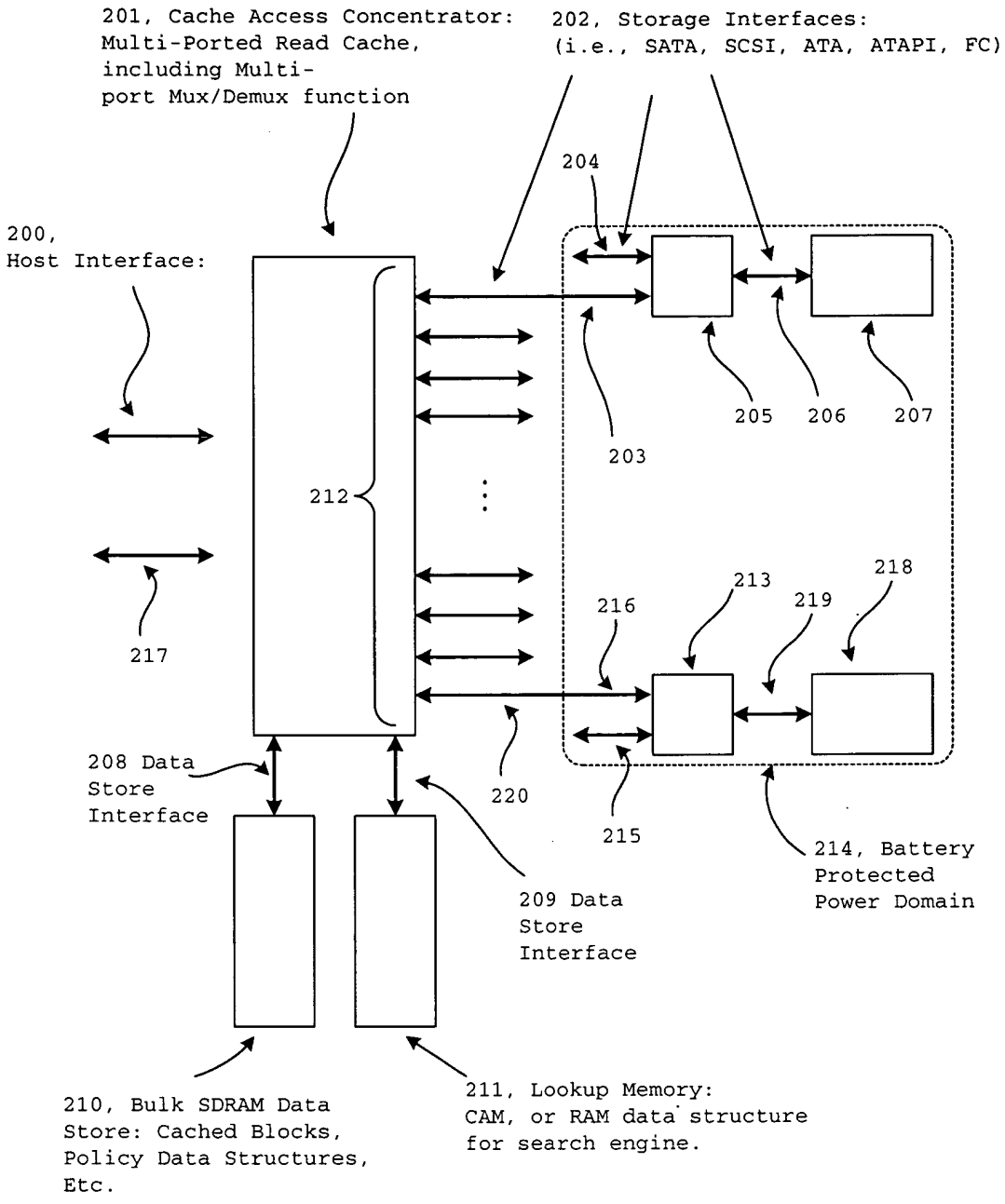

201, Cache Access Concentrator: Multi-Ported Read Cache, including Multi-port Mux/Demux function
202, Storage Interfaces: (i.e., SATA, SCSI, ATA, ATAPI, FC)
204
200, Host Interface:
205
206
207
203
212
217
213
218
216
219
208 Data Store Interface
220
215
214, Battery Protected Power Domain
209 Data Store Interface
210, Bulk SDRAM Data Store: Cached Blocks, Policy Data Structures, Etc.
211, Lookup Memory: CAM, or RAM data structure for search engine.

FIG. 2

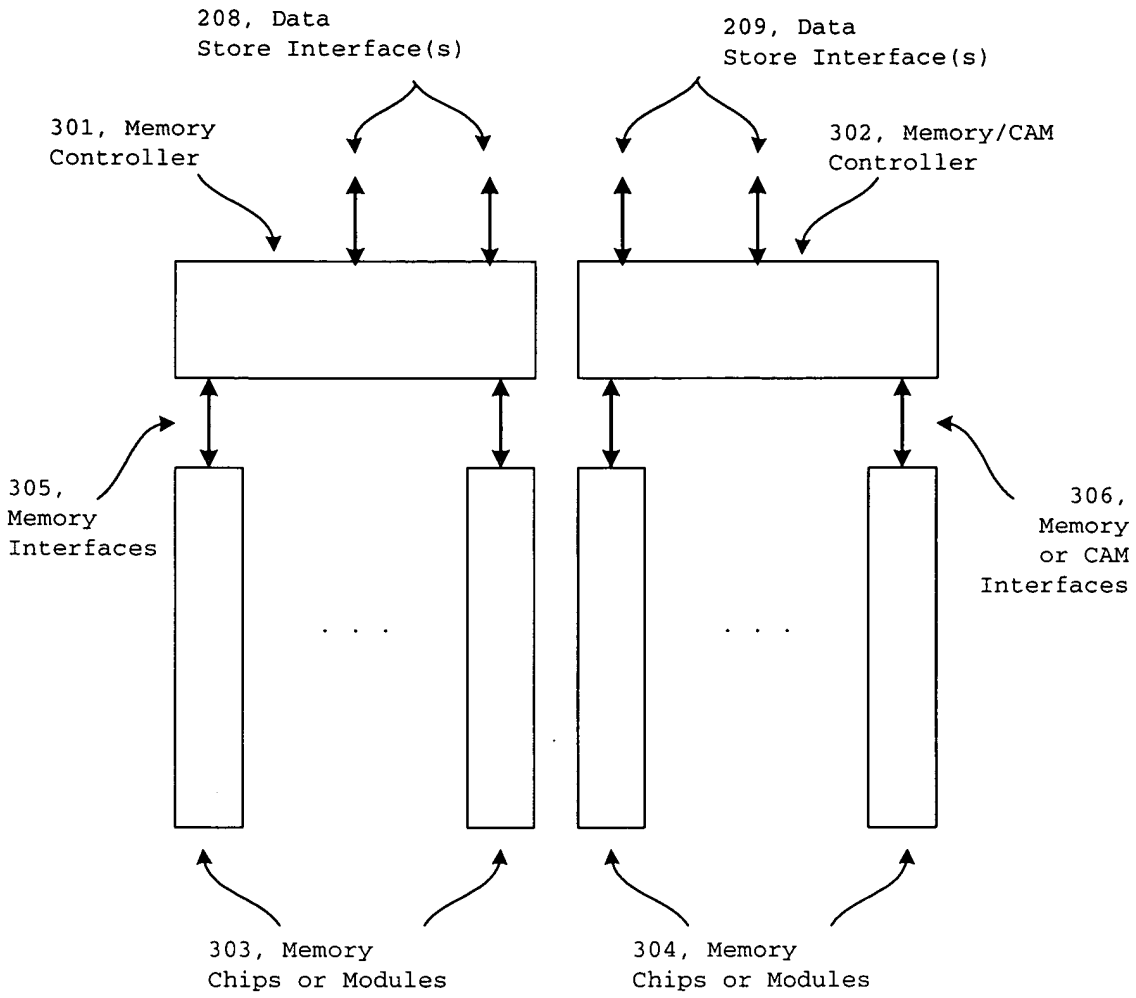

208, Data
Store Interface(s)
209, Data
Store Interface(s)
301, Memory
Controller
302, Memory/CAM
Controller
305,
Memory
Interfaces
306,
Memory
or CAM
Interfaces
303, Memory
Chips or Modules
304, Memory
Chips or Modules

FIG. 3

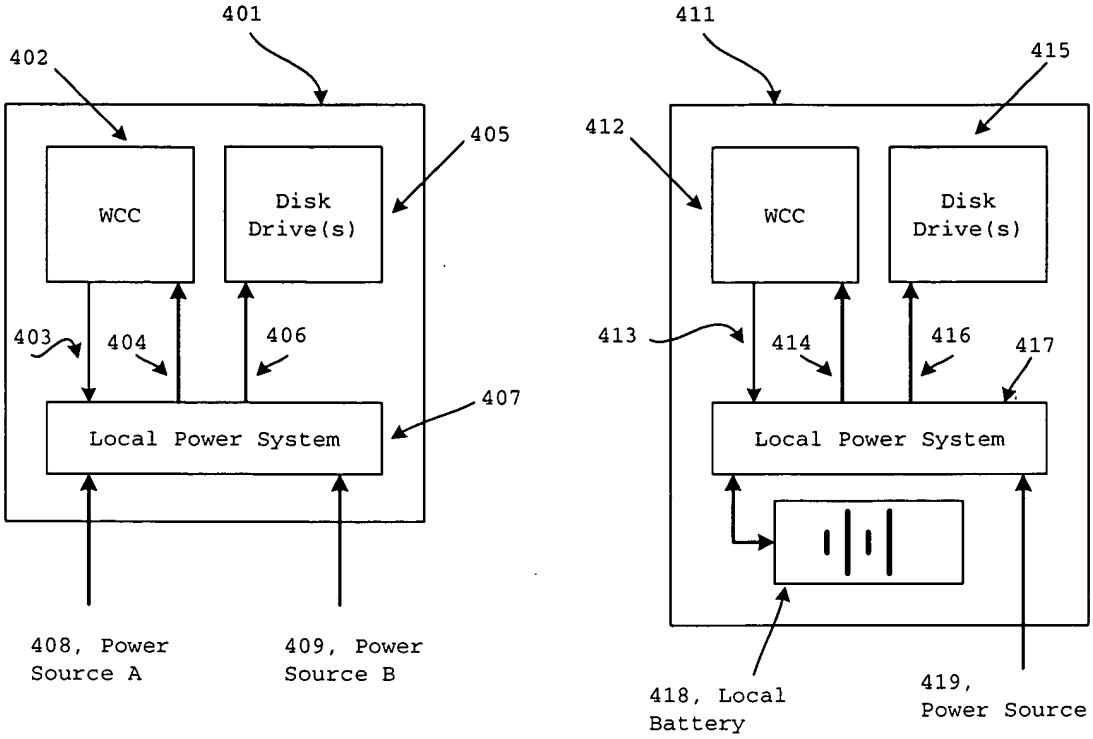

401
402
405
WCC
Disk Drive(s)
403
404
406
407
Local Power System
408, Power Source A
409, Power Source B
411
415
412
WCC
Disk Drive(s)
413
414
416
417
Local Power System
418, Local Battery
419, Power Source

FIG. 4

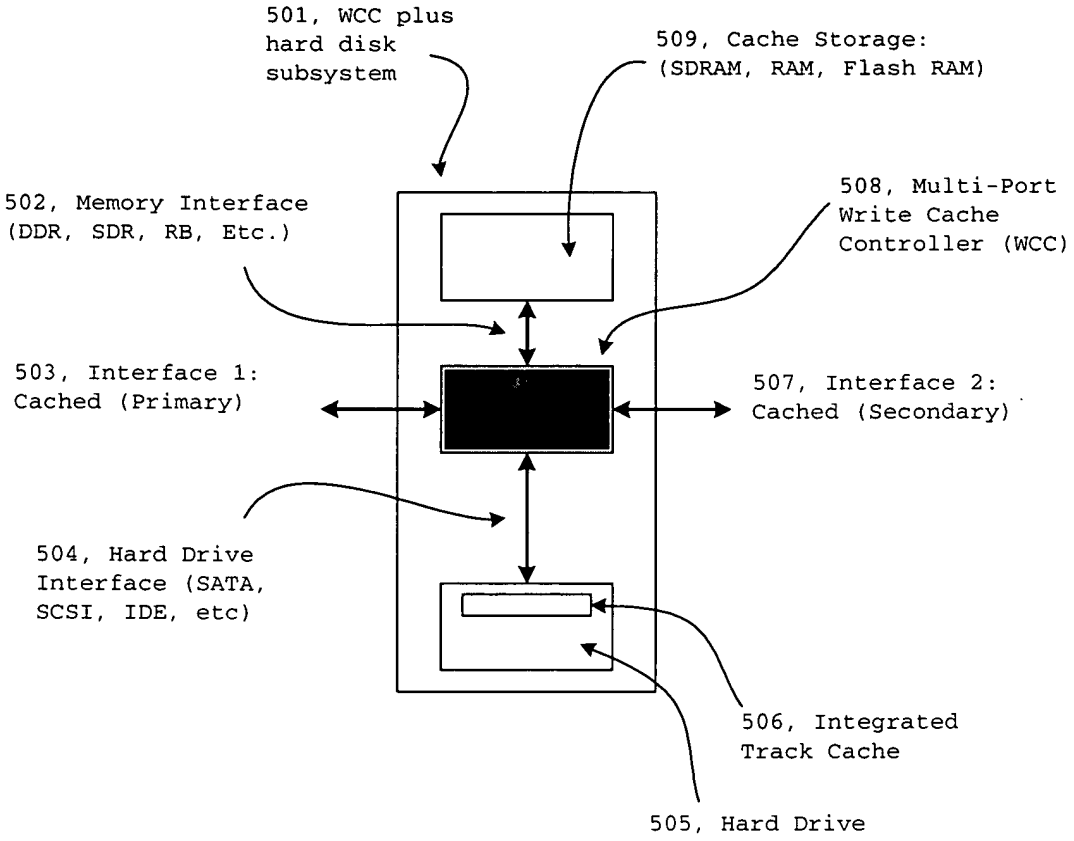

501, WCC plus hard disk subsystem
509, Cache Storage: (SDRAM, RAM, Flash RAM)
502, Memory Interface (DDR, SDR, RB, Etc.)
508, Multi-Port Write Cache Controller (WCC)
503, Interface 1: Cached (Primary)
507, Interface 2: Cached (Secondary)
504, Hard Drive Interface (SATA, SCSI, IDE, etc)
506, Integrated Track Cache
505, Hard Drive

FIG. 5

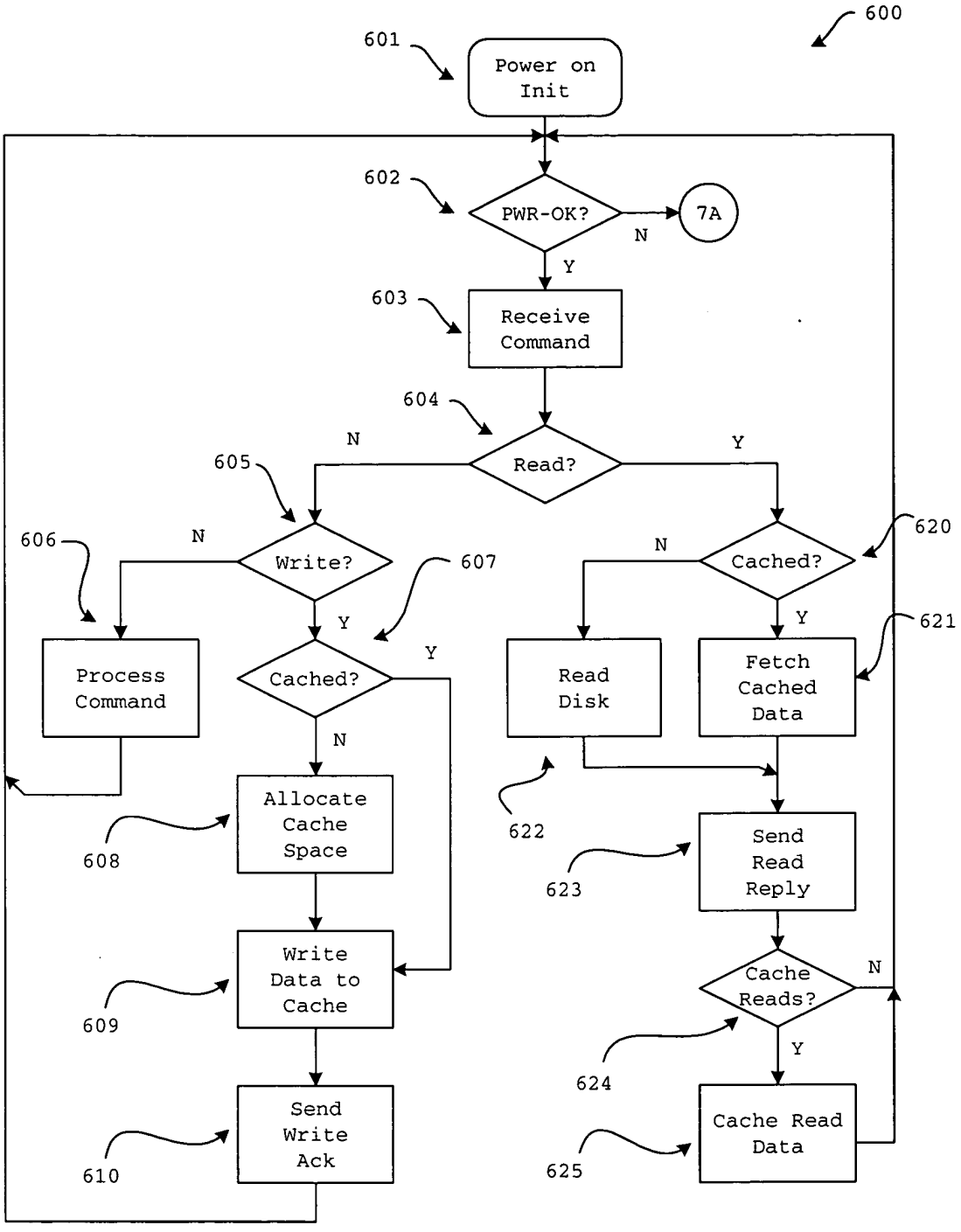

600
601
Power on Init
602
PWR-OK?
N
7A
Y
603
Receive Command
604
Read?
N
Y
605
606
Write?
N
607
Y
Process Command
Cached?
Y
N
608
Allocate Cache Space
609
Write Data to Cache
610
Send Write Ack
620
Cached?
N
Y
621
Read Disk
Fetch Cached Data
622
623
Send Read Reply
Cache Reads?
N
Y
624
625
Cache Read Data

FIG. 6

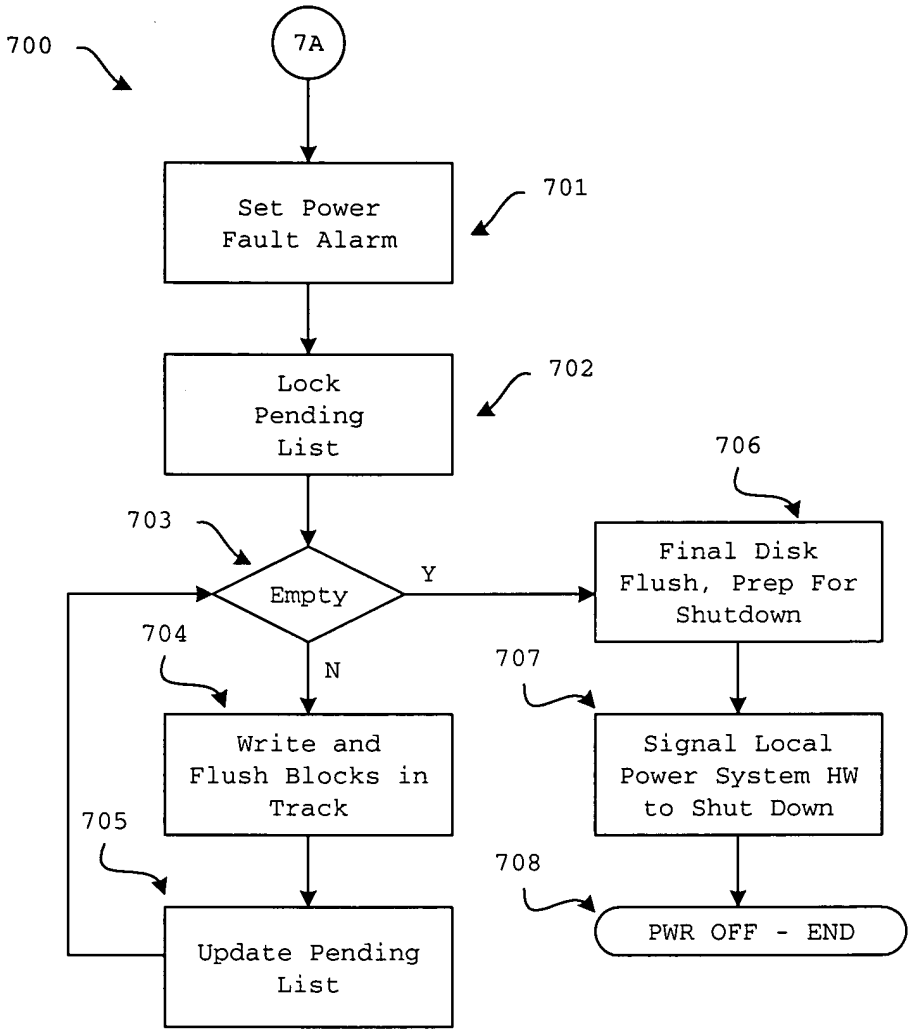

700
7A
Set Power Fault Alarm
701
Lock Pending List
702
703
Empty
Y
N
704
Write and Flush Blocks in Track
705
Update Pending List
706
Final Disk Flush, Prep For Shutdown
707
Signal Local Power System HW to Shut Down
708
PWR OFF - END

FIG. 7

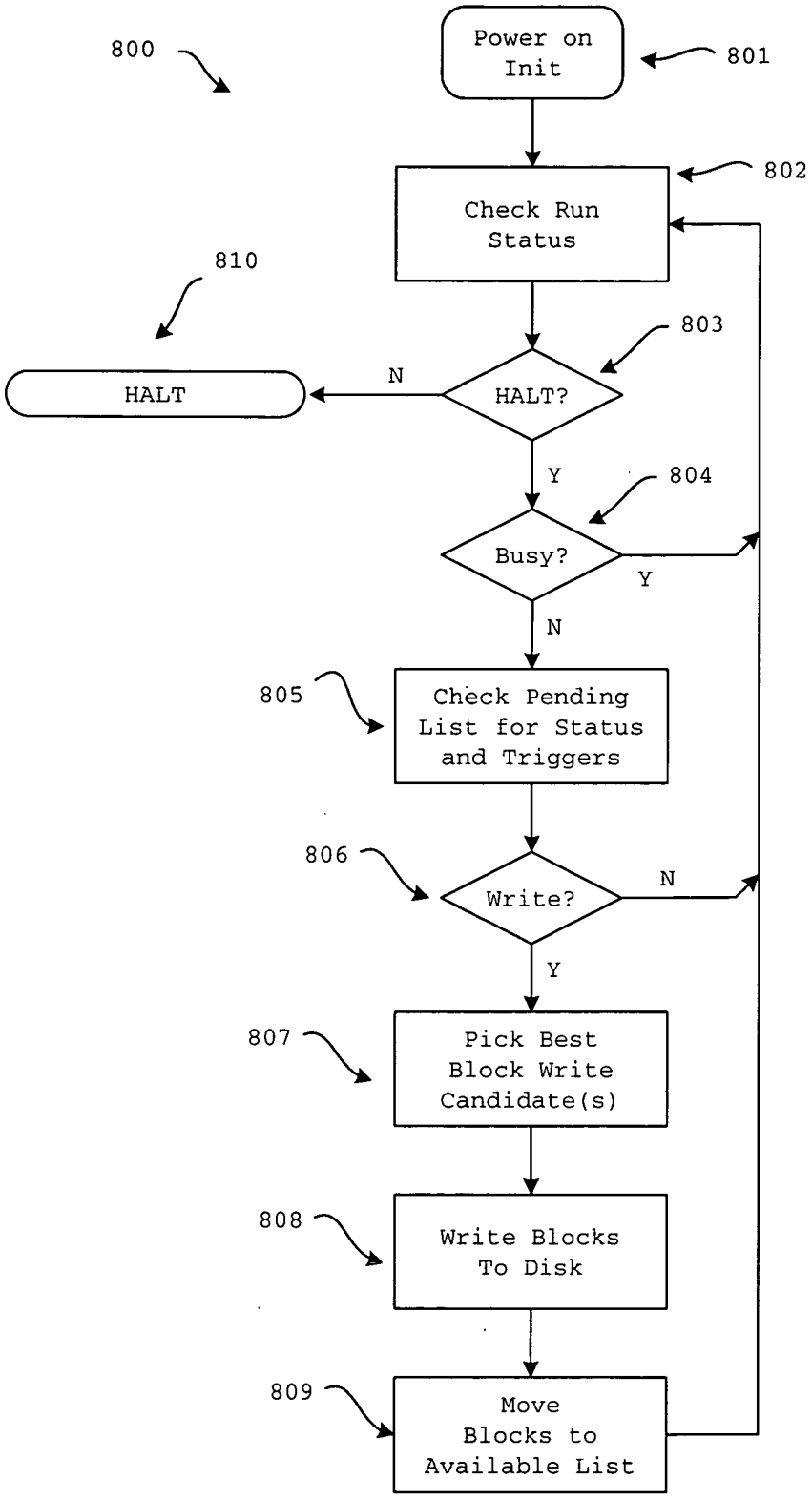

800
Power on Init
801
802
Check Run Status
810
803
HALT
N
HALT?
Y
804
Busy?
Y
N
805
Check Pending List for Status and Triggers
806
Write?
N
Y
807
Pick Best Block Write Candidate(s)
808
Write Blocks To Disk
809
Move Blocks to Available List

FIG. 8

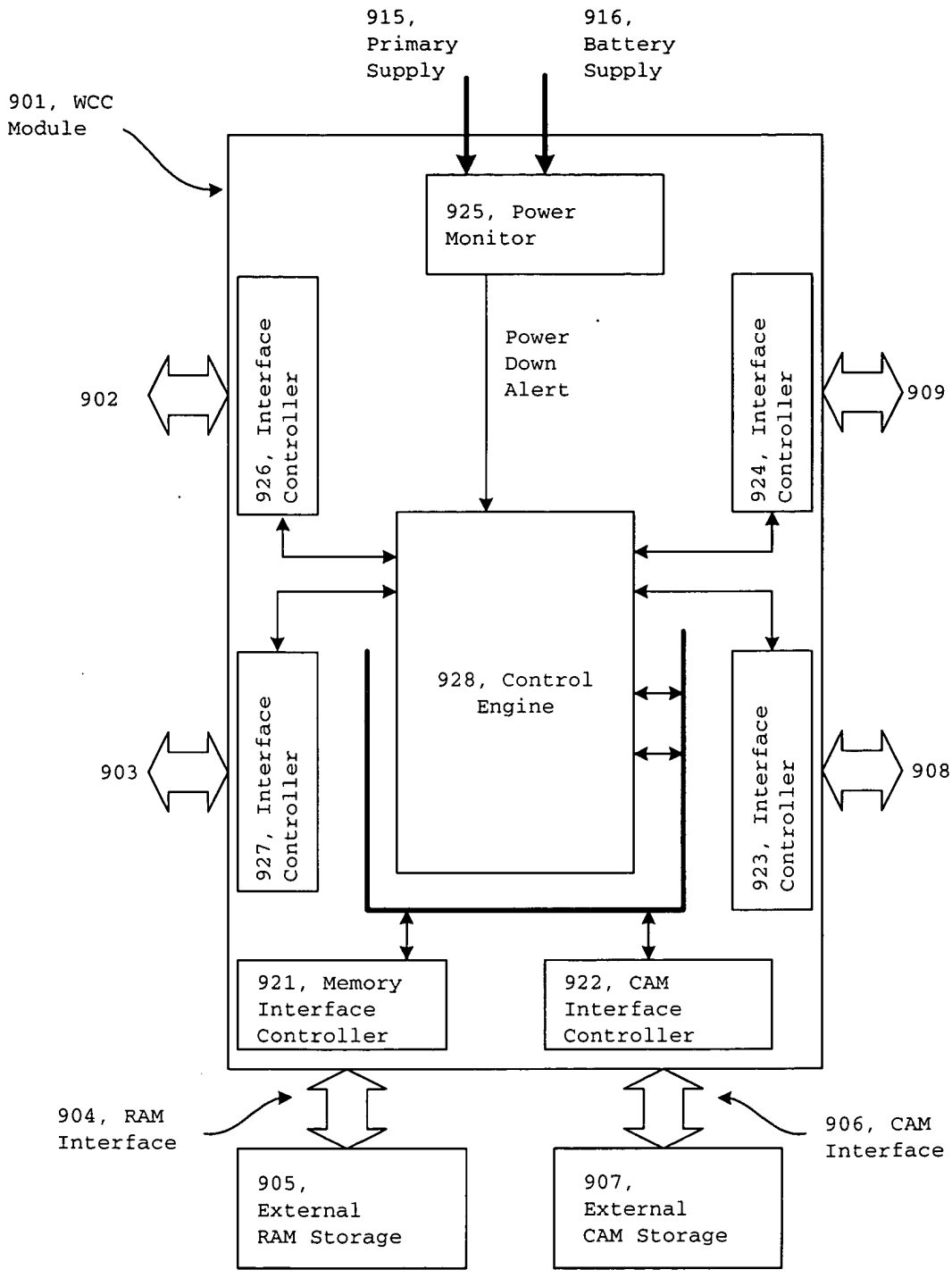
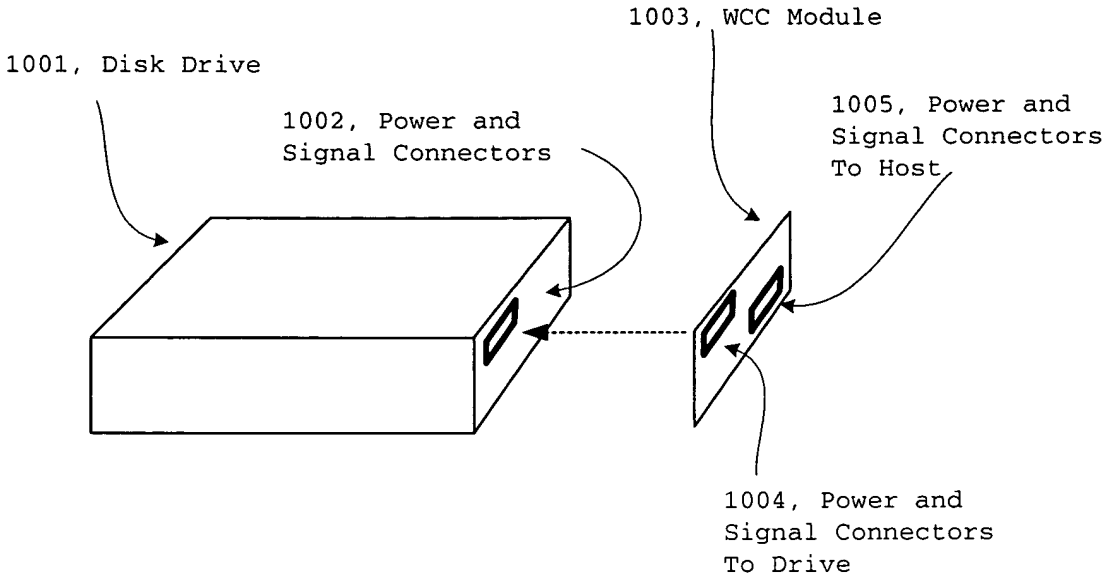

915, Primary Supply
916, Battery Supply
901, WCC Module
925, Power Monitor
926, Interface Controller
924, Interface Controller
Power Down Alert
902
909
928, Control Engine
927, Interface Controller
923, Interface Controller
903
908
921, Memory Interface Controller
922, CAM Interface Controller
904, RAM Interface
906, CAM Interface
905, External RAM Storage
907, External CAM Storage

FIG. 9


1003, WCC Module
1001, Disk Drive
1005, Power and
Signal Connectors
To Host
1002, Power and
Signal Connectors
1004, Power and
Signal Connectors
To Drive

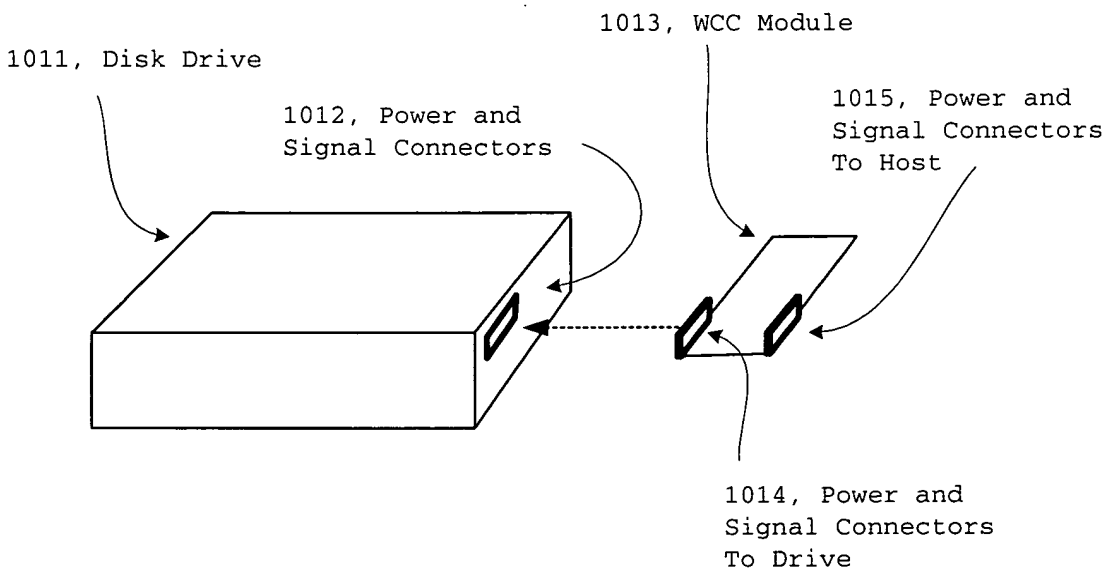

1013, WCC Module
1011, Disk Drive
1015, Power and
Signal Connectors
To Host
1012, Power and
Signal Connectors
1014, Power and
Signal Connectors
To Drive

FIG. 10

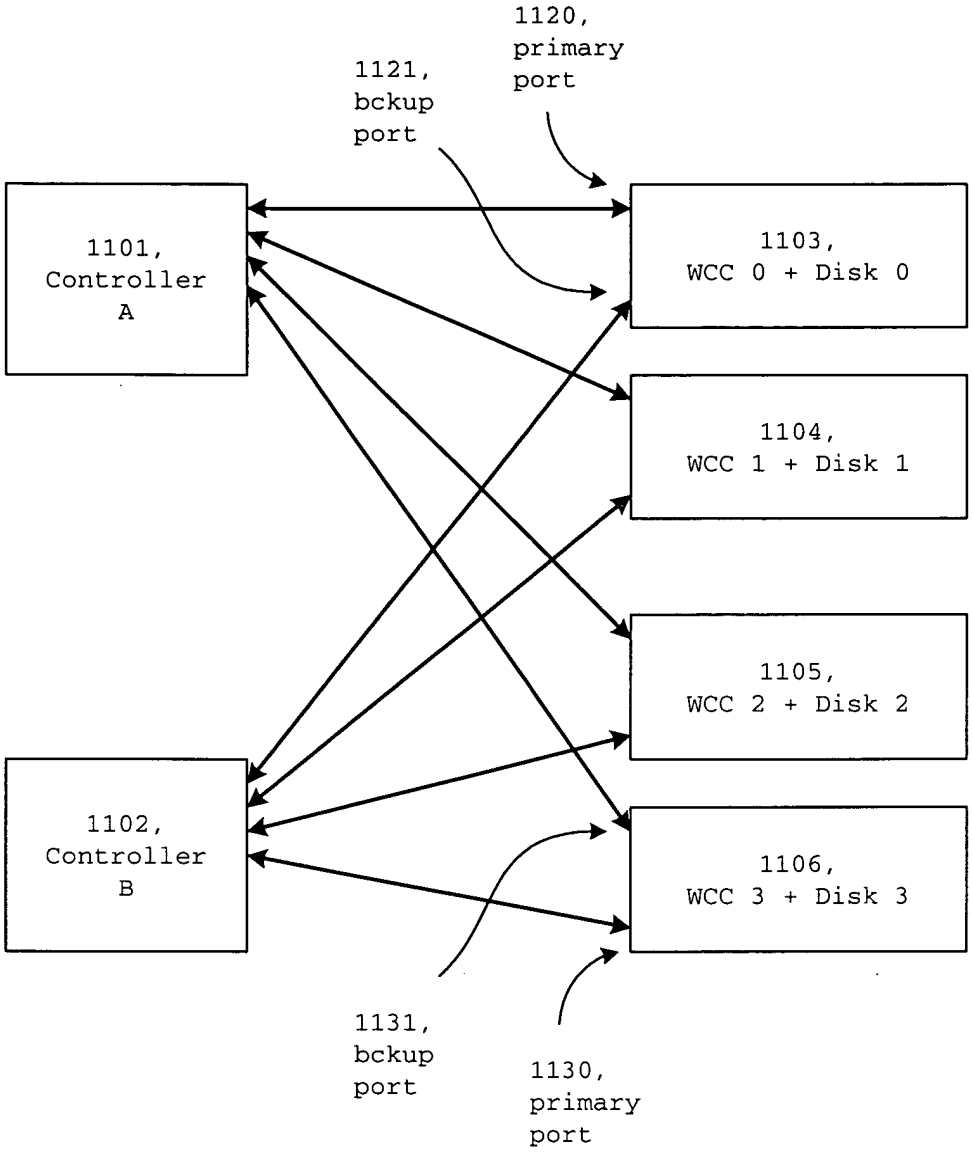

1120,
primary
port
1121,
bckup
port
1101,
Controller
A
1103,
WCC 0 + Disk 0
1104,
WCC 1 + Disk 1
1105,
WCC 2 + Disk 2
1102,
Controller
B
1106,
WCC 3 + Disk 3
1131,
bckup
port
1130,
primary
port

FIG. 11

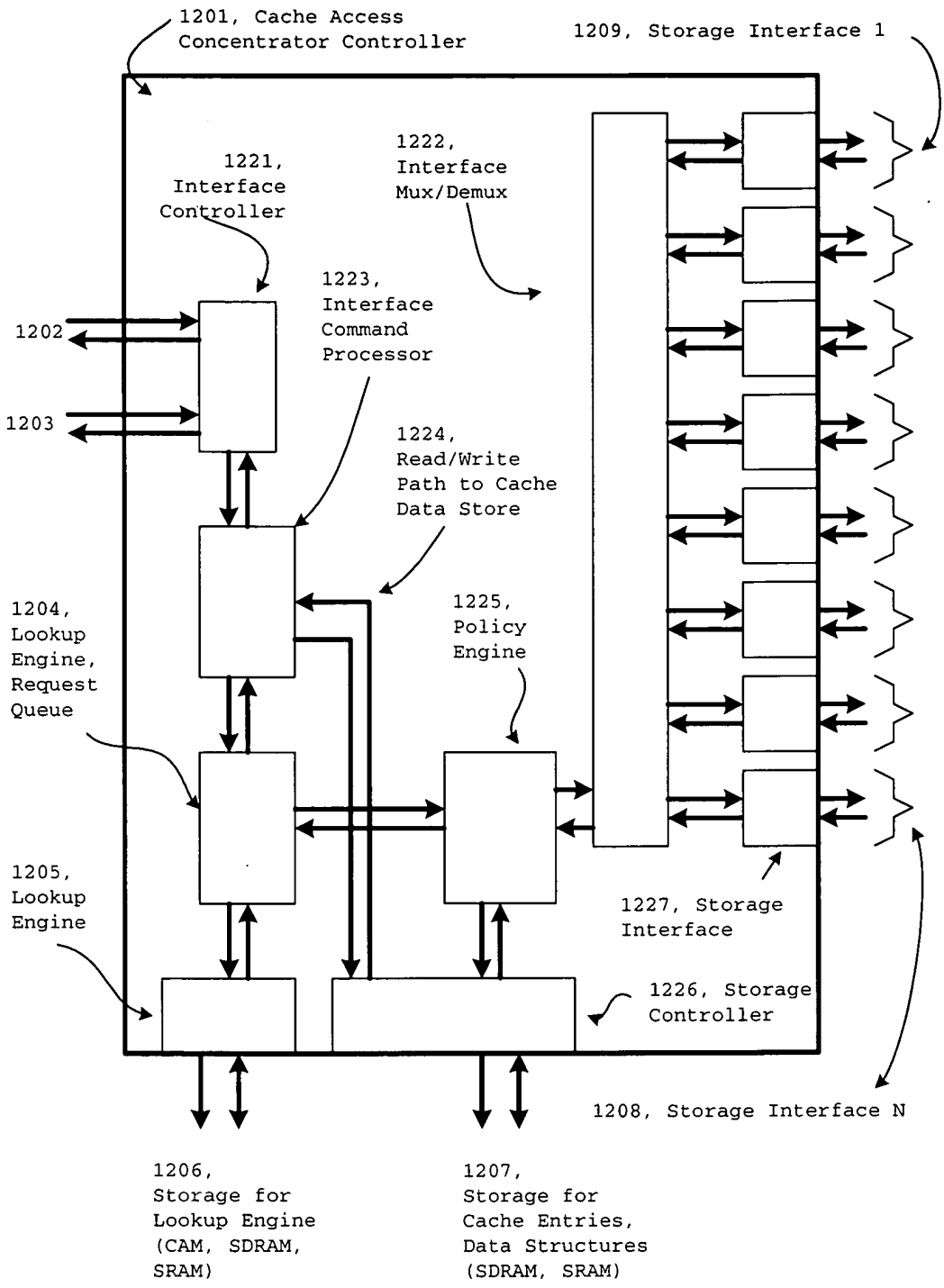

1201, Cache Access Concentrator Controller
1209, Storage Interface 1
1221, Interface Controller
1222, Interface Mux/Demux
1223, Interface Command Processor
1202
1203
1224, Read/Write Path to Cache Data Store
1204, Lookup Engine, Request Queue
1225, Policy Engine
1205, Lookup Engine
1227, Storage Interface
1226, Storage Controller
1208, Storage Interface N
1206, Storage for Lookup Engine (CAM, SDRAM, SRAM)
1207, Storage for Cache Entries, Data Structures (SDRAM, SRAM)

FIG. 12